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(54) **ROAD INFORMATION SHARING METHOD, ROAD INFORMATION SHARING SYSTEM, ROAD INFORMATION SHARING DEVICE, AND ROAD INFORMATION SHARING PROGRAM**

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G08G 1/0968 (2006.01)
G08G 1/0969 (2006.01)
G08G 1/01 (2006.01)

(52) **U.S. Cl.**

CPC ***G08G 1/096855*** (2013.01); ***G08G 1/0112*** (2013.01); ***G08G 1/0141*** (2013.01); ***G08G 1/0969*** (2013.01)

(58) **Field of Classification Search**

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USPC 340/995.12, 905, 995.13, 995.19; 701/117, 119, 208, 209, 211; 348/148, 348/149

See application file for complete search history.

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(57) **ABSTRACT**

A road information sharing method according to the present invention is a road information sharing method for sharing the road information via a terminal device, the road information sharing method including the steps of storing sensor information acquired from a vehicle moving in accompaniment with the terminal device, detecting the road information from the sensor information on the basis of detection rules for detecting the road information, notifying a user about the road information detected, and prompting the user to make a judgment of necessity/unnecessity of registration about the detected road information, and storing the detected road information, if the detected road information is judged to be registration-necessary by the user.

14 Claims, 8 Drawing Sheets

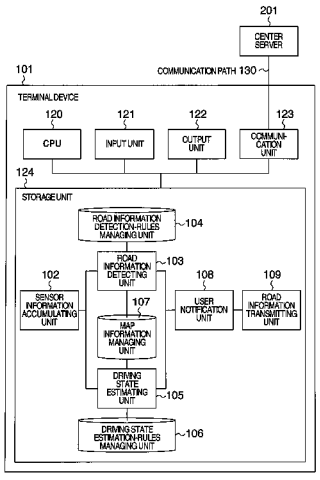

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FIG. 1

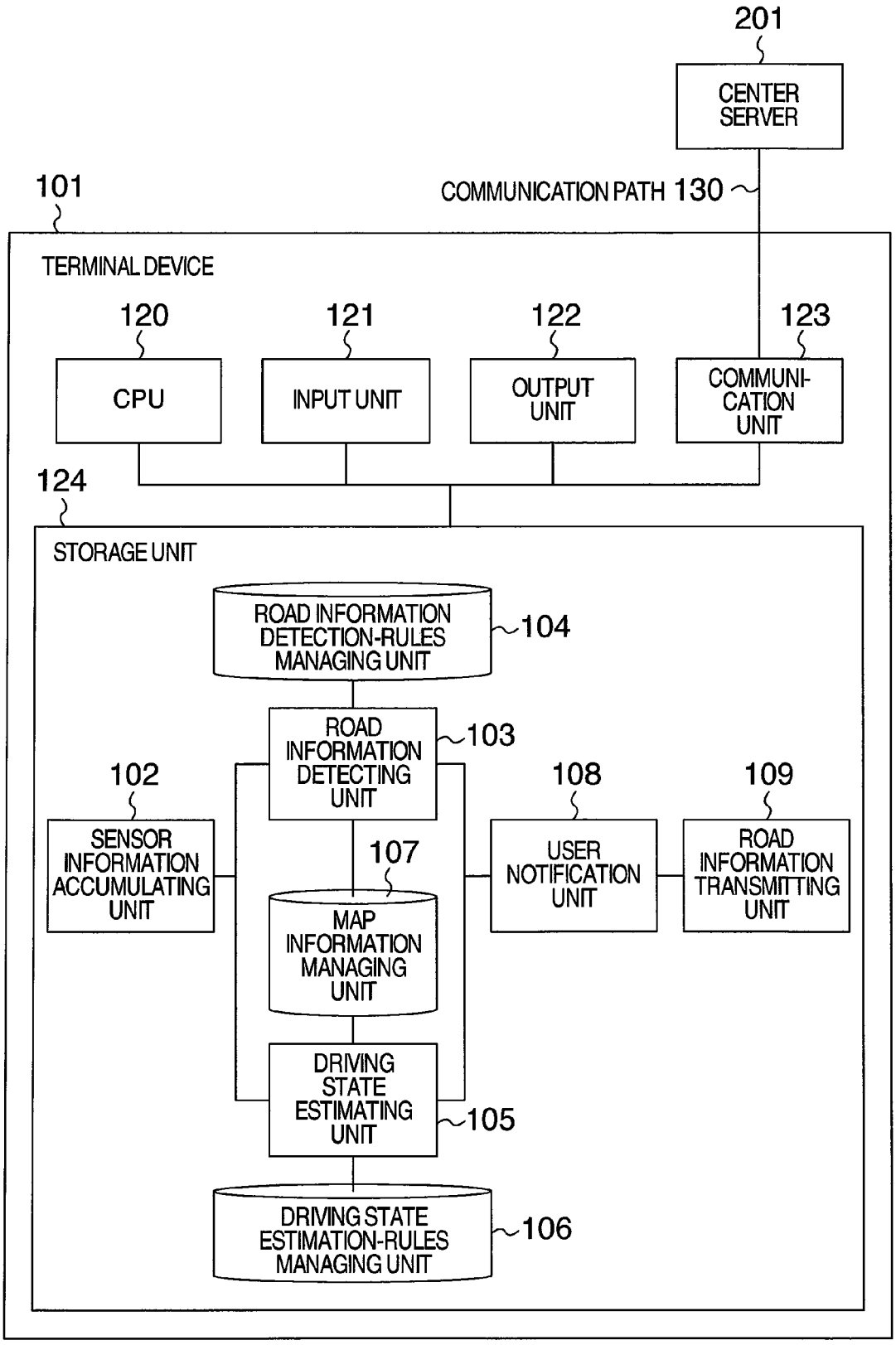

201
CENTER SERVER
COMMUNICATION PATH 130
101
TERMINAL DEVICE
120
CPU
121
INPUT UNIT
122
OUTPUT UNIT
123
COMMUNI-CATION UNIT
124
STORAGE UNIT
ROAD INFORMATION DETECTION-RULES MANAGING UNIT
104
ROAD INFORMATION DETECTING UNIT
103
102
SENSOR INFORMATION ACCUMULATING UNIT
107
MAP INFORMATION MANAGING UNIT
108
USER NOTIFICATION UNIT
109
ROAD INFORMATION TRANSMITTING UNIT
DRIVING STATE ESTIMATING UNIT
105
DRIVING STATE ESTIMATION-RULES MANAGING UNIT
106

FIG. 2

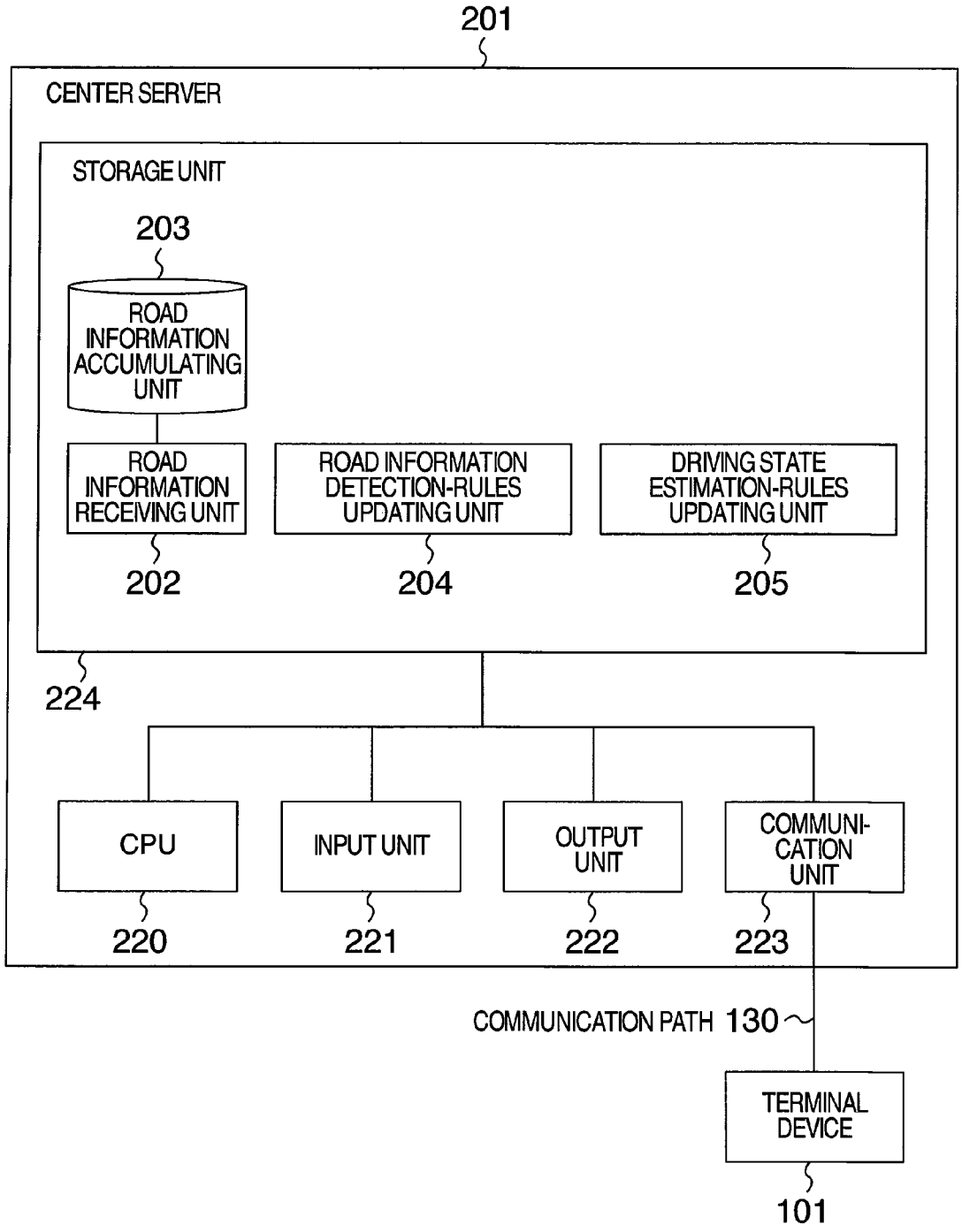

201
CENTER SERVER
STORAGE UNIT
203
ROAD INFORMATION ACCUMULATING UNIT
ROAD INFORMATION RECEIVING UNIT
ROAD INFORMATION DETECTION-RULES UPDATING UNIT
DRIVING STATE ESTIMATION-RULES UPDATING UNIT
202
204
205
224
CPU
INPUT UNIT
OUTPUT UNIT
COMMUNI-CATION UNIT
220
221
222
223
COMMUNICATION PATH 130
TERMINAL DEVICE
101

FIG. 3

104

301 ROAD INFORMATION	302 SENSOR TYPE	303 SENSOR INFORMATION ACQUISITION TIME-PERIOD	304 DETECTION RULE
NEW ROAD	GPS SENSOR	3 MINUTES	THE POSITION INFORMATION DEVIATES FROM THE ROAD LINK, AND AFTER MOVING FOR A WHILE ABOUT A PLACE OTHER THAN THE ROAD LINK, THE POSITION INFORMATION RIDES ON ANOTHER ROAD LINK
CLOSED TO TRAFFIC	GPS SENSOR	60 SECONDS	THE POSITION INFORMATION MOVES ALONG THE ROAD LINK IN THE OPPOSITE DIRECTION IN A SHORT TIME
U-TURN AVAILABLE	GPS SENSOR	60 SECONDS	THE POSITION INFORMATION MOVES ALONG THE ROAD LINK IN THE OPPOSITE DIRECTION IN A SHORT TIME
PARKING-LOT ENTRANCE	GPS SENSOR	120 SECONDS	AFTER THE POSITION INFORMATION HAS DEVIATED FROM THE ROAD LINK, THE POSITION INFORMATION REMAINS UNCHANGED DURING A CONSTANT TIME-PERIOD
BYROAD	GPS SENSOR	10 MINUTES	THE POSITION INFORMATION SHORTCUTS THE SCHEDULED ROUTE
DANGEROUS SPOT	ACCELERATION SENSOR OR GYRO SENSOR	5 SECONDS	NEGATIVE ACCELERATION MORE THAN 0.2G GENERATES

FIG. 4

106

401 DRIVING STATE	402 SENSOR TYPE	403 SENSOR INFORMATION ACQUISITION TIME-PERIOD	404 ESTIMATION RULE
WAITING FOR SIGNAL CHANGE	GPS SENSOR	5 SECONDS	THE POSITION INFORMATION REMAINS UNCHANGED IN PROXIMITY TO THE INTERSECTION POINT DURING 5 SECONDS
STOP AT PARKING LOT	GPS SENSOR	10 SECONDS	AFTER THE POSITION INFORMATION HAS DEVIATED FROM THE ROAD LINK, THE POSITION INFORMATION REMAINS UNCHANGED DURING 10 SECONDS
SLOW DRIVING/ TRAFFIC CONGESTION	ACCELERATION SENSOR	5 SECONDS	THE ACCELERATION IS LESS THAN A PREDETERMINE VALUE DURING A CONSTANT TIME-PERIOD

FIG. 5

203

501 ROAD INFORMATION	502 OCCURRENCE POSITION	503 OCCURRENCE POINT-IN-TIME
NEW ROAD	(X1, Y1)–(X2, Y2)– ···	2013/7/24/ 15:27:36
PARKING-LOT ENTRANCE	(X1, Y1)	2013/7/24/ 13:11:05

FIG. 6

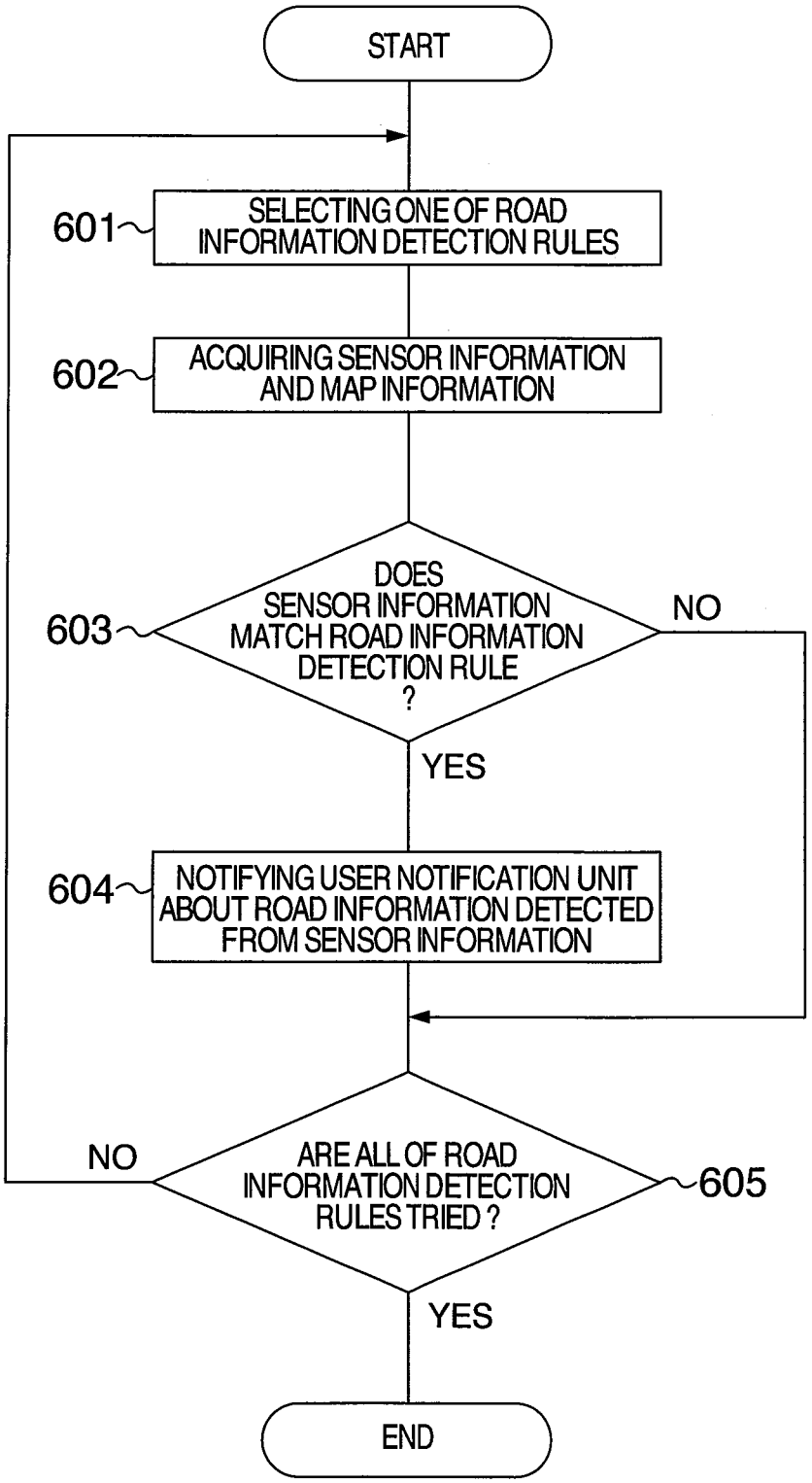

START
601
SELECTING ONE OF ROAD INFORMATION DETECTION RULES
602
ACQUIRING SENSOR INFORMATION AND MAP INFORMATION
603
DOES SENSOR INFORMATION MATCH ROAD INFORMATION DETECTION RULE ?
NO
YES
604
NOTIFYING USER NOTIFICATION UNIT ABOUT ROAD INFORMATION DETECTED FROM SENSOR INFORMATION
NO
ARE ALL OF ROAD INFORMATION DETECTION RULES TRIED ?
605
YES
END

FIG. 7

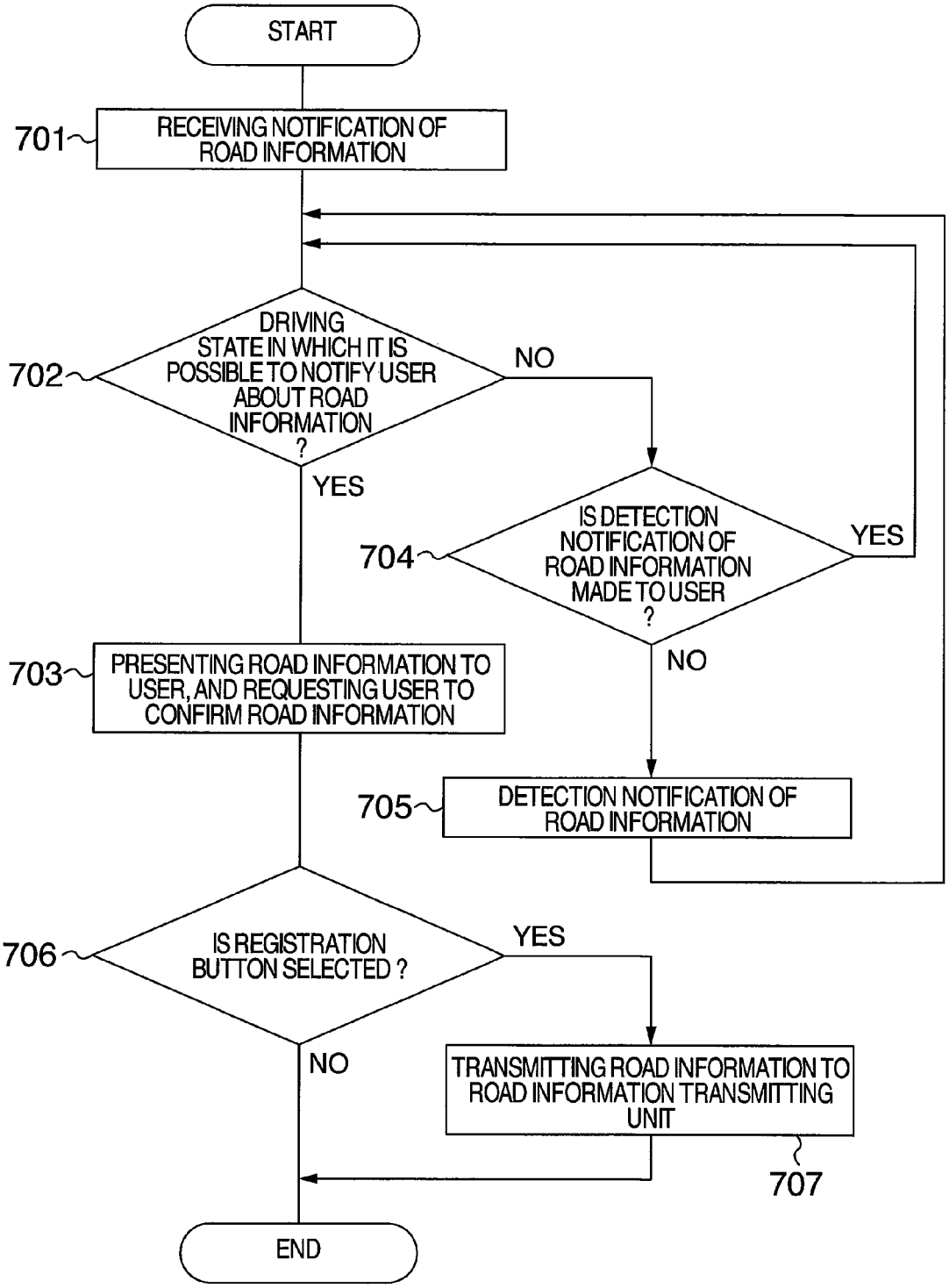

START
701
RECEIVING NOTIFICATION OF ROAD INFORMATION
702
DRIVING STATE IN WHICH IT IS POSSIBLE TO NOTIFY USER ABOUT ROAD INFORMATION ?
NO
YES
704
IS DETECTION NOTIFICATION OF ROAD INFORMATION MADE TO USER ?
YES
NO
703
PRESENTING ROAD INFORMATION TO USER, AND REQUESTING USER TO CONFIRM ROAD INFORMATION
705
DETECTION NOTIFICATION OF ROAD INFORMATION
706
IS REGISTRATION BUTTON SELECTED ?
YES
NO
TRANSMITTING ROAD INFORMATION TO ROAD INFORMATION TRANSMITTING UNIT
707
END

FIG. 8

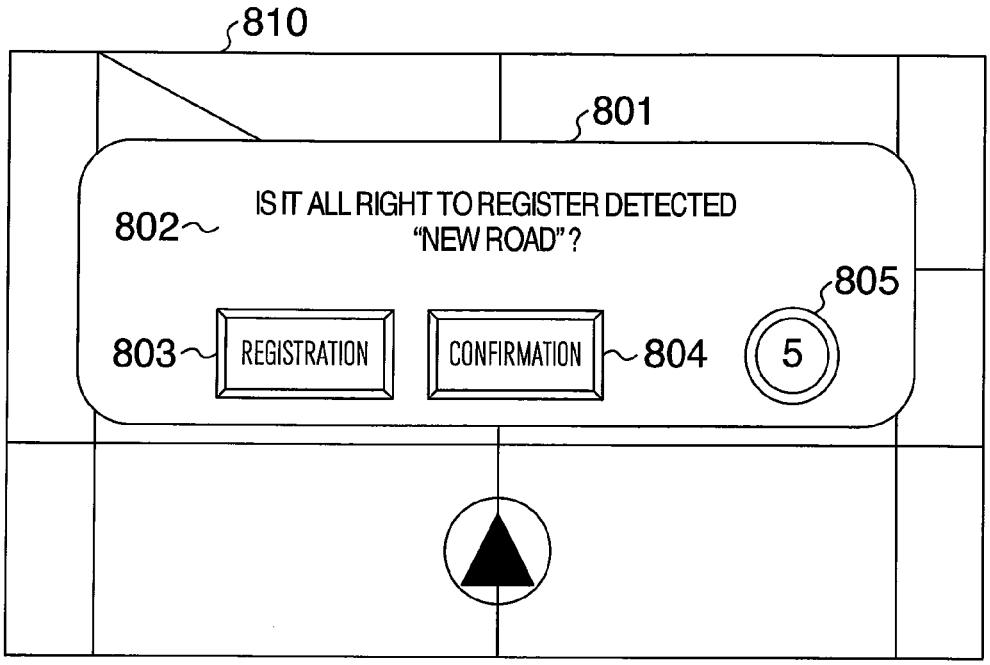
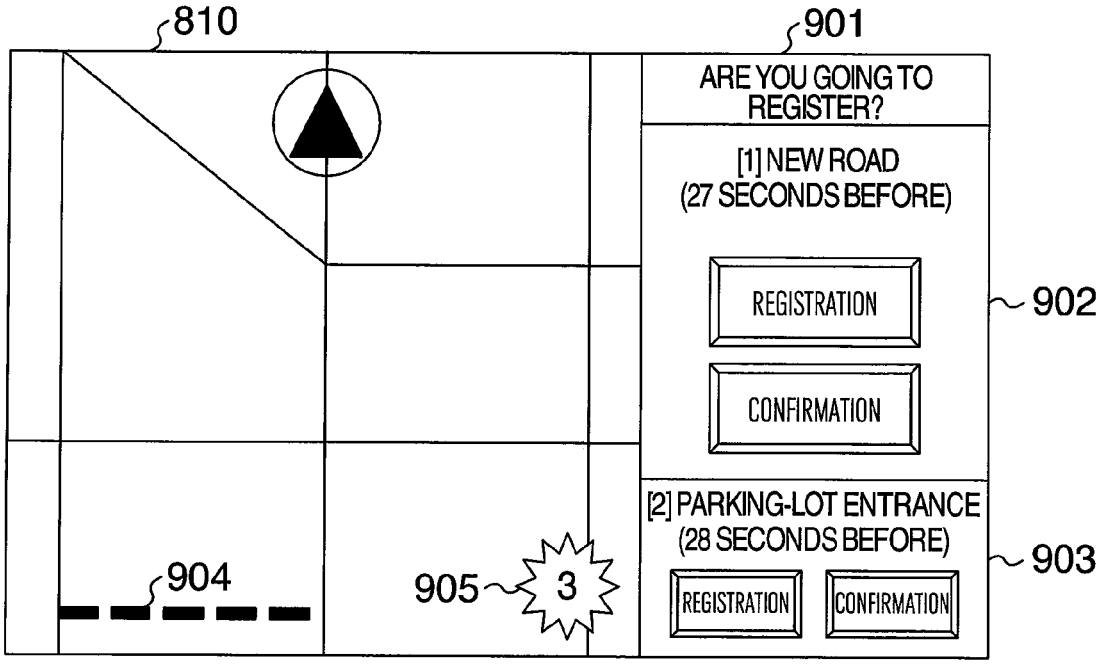

810
801
802
IS IT ALL RIGHT TO REGISTER DETECTED "NEW ROAD"?
805
803
REGISTRATION
CONFIRMATION
804
5

FIG. 9


810
901
ARE YOU GOING TO REGISTER?
[1] NEW ROAD (27 SECONDS BEFORE)
REGISTRATION
CONFIRMATION
902
[2] PARKING-LOT ENTRANCE (28 SECONDS BEFORE)
903
REGISTRATION
CONFIRMATION
904
905
3

ROAD INFORMATION SHARING METHOD, ROAD INFORMATION SHARING SYSTEM, ROAD INFORMATION SHARING DEVICE, AND ROAD INFORMATION SHARING PROGRAM

INCORPORATION BY REFERENCE

The present application claims priority from Japanese application JP 2013-223819 filed on Oct. 29, 2013, the content of which is hereby incorporated by reference into this application.

BACKGROUND OF THE INVENTION

The present invention relates to a road information sharing method, system, device, and program.

In the conventional technologies, as one of the methods for sharing between users the road information such as byroad, road closed to traffic for construction, and dangerous spot, there exists a method for automatically generating the road information, and sharing this information with another vehicle. For example, in JP-A-2009-181472, it is disclosed that, if, by a dangerous-state judgment unit, a vehicle is judged to be placed in a dangerous state that is included within a plurality of dangerous-state classifications determined in advance, predetermined danger information is transmitted to the outside within a transmission range corresponding to this dangerous state in which the vehicle is judged to be placed.

SUMMARY OF THE INVENTION

Namely, JP-A-2009-181472 discloses the method for automatically judging the dangerous state of a vehicle, and sharing with another vehicle the road information indicating that the vehicle is placed in the dangerous state. It is certain, however, that a noise (i.e., judgment failure) will be included in such a method. As a result, the certainty of the information becomes lowered. For example, there exist the following possibilities: The vehicle is judged to be in the dangerous state instead that it is not in the dangerous state actually; or conversely, the vehicle is judged not to be in the dangerous state instead that it is in the dangerous state actually. In view of this problem, the object of the present invention is to eliminate the noise caused by the judgment failure, and to enhance the certainty of the road information by prompting users to confirm the road information judged.

A road information sharing method according to the present invention is a road information sharing method in a road information sharing system for sharing road information, the road information sharing method including the steps of storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with the terminal device, detecting road information from the sensor information on the basis of detection rules for detecting the road information, notifying a user about the road information detected, and prompting the user to make a judgment of necessity/unnecessity of the registration about the detected road information, and if the detected road information is judged to be registration-necessary by the user, storing or outputting to the outside the detected road information. Also, the road information sharing system according to the present invention is the road information sharing system for sharing road information in a center server via a terminal device, wherein the terminal device includes a sensor information storage unit for storing sensor information acquired from the terminal device or a vehicle, the vehicle moving in accompaniment with the terminal device, a road information detection-rules managing unit for managing detection rules for detecting the road information, a road information detecting unit for detecting the road information from the sensor information on the basis of the detection rules, a user notification unit for notifying a user about the road information detected, and prompting the user to make a judgment of necessity/unnecessity of registration about the detected road information, and a road information transmitting unit for transmitting the detected road information to the center server, if the detected road information is judged to be registration-necessary by the user notification unit, the center server including a road information storage unit for storing the road information received from the terminal device.

Moreover, a road information sharing device according to the present invention is a road information sharing device for sharing road information, the road information sharing device including a sensor information storage unit for storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with the terminal device, a road information detection-rules managing unit for managing detection rules for detecting the road information, a road information detecting unit for detecting the road information from the sensor information on the basis of the detection rules, a user notification unit for notifying a user about the detected road information via the terminal device in order to prompt the user to make a judgment of necessity/unnecessity of registration about the detected road information, and a road information storage unit for storing the road information, if the detected road information is judged to be registration-necessary as a result of having notified the user about the detected road information.

Also, a road information sharing program according to the present invention is a road information sharing program for sharing road information, wherein the road information sharing program causes a computer to execute the steps of storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with the terminal device, detecting the road information from the sensor information on the basis of detection rules for detecting the road information, notifying a user about the road information detected, and prompting the user to make a judgment of necessity/unnecessity of registration about the detected road information, and if the detected road information is judged to be registration-necessary by the user, storing or outputting the detected road information to the outside.

According to the present invention, it becomes possible to share between users the higher reliability road information.

Other objects, features and advantages of the invention will become apparent from the following description of the embodiments of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates the configuration of a road information sharing system according to the present embodiment;

FIG. **2** illustrates the configuration of a center server according to the present embodiment;

FIG. **3** illustrates the table configuration of a road information detection-rules managing unit according to the present embodiment;

FIG. **4** illustrates the table configuration of a driving state estimation-rules managing unit according to the present embodiment;

FIG. **5** illustrates the table configuration of a road information storage unit according to the present embodiment;

FIG. **6** illustrates the processing flow performed by a road information detecting unit according to the present embodiment;

FIG. **7** illustrates the processing flow performed by a user notification unit according to the present embodiment;

FIG. **8** illustrates a image example of the terminal device according to the present embodiment; and

FIG. **9** illustrates another image example of the terminal device according to the present embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENT

A road information sharing method according to an embodiment of the present invention is a road information sharing method in a road information sharing system for sharing road information, the road information sharing method including the steps of storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with the terminal device, detecting the road information from the sensor information on the basis of detection rules for detecting the road information, notifying a user about the road information detected, and prompting the user to make a judgment of necessity/unnecessity of registration about the detected road information, and if the detected road information is judged to be registration-necessary by the user, storing the detected road information or outputting to the outside. Here, the outside means an external device for storing the road information to be shared between the users. Such configuration makes it possible to enhance the reliability of the road information shared between the users via the terminal device. Also, the driving state of the vehicle is estimated from the sensor information on the basis of estimation rules for estimating the driving state of the vehicle moving in accompaniment with the terminal device. Next, based on the driving state estimated, it is judged whether or not the driving state is a state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration about the detected road information. Moreover, if the driving state is the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, the user is prompted to make the judgment of necessity/unnecessity of registration. Otherwise, if the driving state is not the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, the driving state is waited for to become the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, and then the user is prompted to make the judgment of necessity/unnecessity of registration. In this case, it becomes possible to enhance the reliability of the road information without imposing an excessive load onto the user who is driving the vehicle.

Also, if the road information is detected by a road information detecting unit, the user is notified about the detected road information. Simultaneously, if the driving state is judged to be the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, the user is prompted to make the judgment of necessity/unnecessity of registration. Otherwise, if the driving state is judged not to be the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, the user is notified that the user will be prompted to make the judgment of necessity/unnecessity of registration later. In this case, it becomes possible to smoothly proceed with the judgment of necessity/unnecessity of registration by notifying in advance that the road information has been detected. Furthermore, preferably, it is judged based on map information and the stored sensor information whether or not it should be performed to prompt the user to make the judgment of necessity/unnecessity of registration. Also, the following configuration is also allowable: The road information sharing method is so implemented as to execute the notification to the user in plural times, its first notification notifying the user about the detection of the road information by using a sound, its second notification notifying the user about information by using pop-up or image information, the information for prompting the user to make the judgment of necessity/unnecessity of registration about the detected road information. In this way, it becomes possible to reduce the load onto the user by displaying the image when prompting the user to make the judgment of necessity/unnecessity of registration, and by notifying by the voice in the other cases.

Also, the following configuration is also allowable. If the driving state changes from the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration to the state in which it should not prompt the user to do so, an image is controlled so as not to display for prompting the user to make the judgment of necessity/unnecessity of registration. Also, the following configuration is also allowable. If the plural pieces of road information are detected, the user is notified about the detected plural pieces of road information in accordance with priority degrees being assigned to the plural pieces of road information on the basis of respective detection points-in-time or respective distances between the detection locations and the present positions.

Next, a road information sharing system according to an embodiment of the present invention is a road information sharing system for sharing road information in a center server via a terminal device, wherein the terminal device includes a sensor information storage unit for storing sensor information acquired from the terminal device or a vehicle moving in accompaniment with the terminal device, a road information detection-rules managing unit for managing detection rules for detecting the road information, a road information detecting unit for detecting the road information from the sensor information on the basis of the detection rules, a user notification unit for notifying a user about the road information detected, and prompting the user to make a judgment of necessity/unnecessity of registration about the detected road information, and a road information transmitting unit for transmitting the detected road information to the center server, if the detected road information is judged to be registration-necessary by the user notification unit, the center server including a road information storage unit for storing the road information received from the terminal device. Such configuration makes it possible to enhance the reliability of the road information shared between the users.

Also, the terminal device further includes a driving state estimation-rules managing unit for managing estimation rules for estimating the driving state of the vehicle moving in accompaniment with the terminal device, and a driving state estimating unit for estimating the driving state of the vehicle from the sensor information on the basis of the estimation rules, the user notification unit judging, based on the driving state estimated, whether or not the driving state is a state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration about the detected road information. Moreover, if the driving state is the state in which it is allowable to prompt the user to

make the judgment of necessity/unnecessity of registration, the user notification unit prompts the user to make the judgment of necessity/unnecessity of registration. Otherwise, if the driving state is not the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, the user notification unit waits for the driving state to become the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, and then prompts the user to make the judgment of necessity/unnecessity of registration. In this case, it becomes possible to enhance the reliability of the road information without imposing an excessive load on the user who is driving the vehicle.

Also, if the road information is detected by the road information detecting unit, the user notification unit notifies the user about the detected road information. Simultaneously, if the driving state is judged to be the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration by the driving state estimating unit, the user notification unit prompts the user to make the judgment of necessity/unnecessity of registration. Otherwise, if the driving state is judged not to be the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration by the driving state estimating unit, the user notification unit notifies the user that the user will be prompted to make the judgment of necessity/unnecessity of registration later. In this case, it becomes possible to smoothly implement the judgment of necessity/unnecessity of registration by notifying in advance that the road information has been detected.

Next, a road information sharing device according to an embodiment of the present invention is a road information sharing device for sharing road information, the road information sharing device including a sensor information storage unit for storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with the terminal device, a road information detection-rules managing unit for managing detection rules for detecting the road information, a road information detecting unit for detecting the road information from the sensor information on the basis of the detection rules, a user notification unit for notifying a user about the detected road information via the terminal device in order to prompt the user to make a judgment of necessity/unnecessity of registration about the detected road information, and a road information storage unit for storing the road information, if the detected road information is judged to be registration-necessary as a result of having notified the user about the detected road information. Such configuration makes it possible to enhance the reliability of the road information shared between the users. Also, the road information sharing device further includes a driving state estimation-rules managing unit for managing estimation rules for estimating the driving state of the vehicle moving in accompaniment with the terminal device, and a driving state estimating unit for estimating the driving state of the vehicle from the sensor information on the basis of the estimation rules, the user notification unit judging, based on the driving state estimated, whether or not the driving state is a state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration about the detected road information.

Furthermore, if the driving state is the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, the user notification unit prompts the user to make the judgment of necessity/unnecessity of registration. Otherwise, if the driving state is not the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, the user notification unit waits for the driving state to become the state in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration, and then notifies the user that the user will be prompted to make the judgment of necessity/unnecessity of registration. In this case, it becomes possible to enhance the reliability of the road information without imposing an excessive load to the user who is driving the vehicle.

Also, a road information sharing program according to an embodiment of the present invention is a road information sharing program for sharing road information, wherein the road information sharing program causes a computer to execute the steps of storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with the terminal device, detecting the road information from the sensor information on the basis of detection rules for detecting the road information, notifying a user about the road information detected, and prompting the user to make a judgment of necessity/unnecessity of registration about the detected road information, and storing the detected road information, or outputting the detected road information to the outside, if the detected road information is judged to be registration-necessary by the user. Here, the outside means an external device for storing the road information to be shared between the users. Such configuration makes it possible to enhance the reliability of the road information shared between the users via the terminal device.

Hereinafter, referring to the drawings, the detailed explanation will be given below concerning embodiments of the present invention.

FIG. **1** illustrates the configuration of a road information sharing system in the present embodiment. This road information sharing system includes a terminal device **101** and a center server **201**. The terminal device **101** may be an information terminal device such as a smartphone or a tablet terminal, or may be a navigation device to be mounted on a vehicle. The terminal device **101** and the center server **201** are connected to each other via a communications path **130**. The communications path **130** may be a mobile network, or a wireless communications path such as wireless LAN.

The terminal device **101** includes a CPU (Central Processing Unit) **120**, an input unit **121**, an output unit **122**, a communication unit **123**, and a storage unit **124**. The storage unit **124**, which is a device such as semiconductor memories or HDD (Hard Disk Drive), stores programs and data therein. The CPU **120** executes the processing of the terminal device **101** on the basis of the programs and data stored in the storage unit **124**. The input unit **121** detects operations performed by the user. The output unit **122** displays an image, or makes a sound in accordance with the instruction from the CPU **120**. The communication unit **123** performs the communication with the center server **201**.

Here, an explanation will be given regarding the storage unit **124**. The storage unit **124** stores a program and/or data for implementing each of the following configuration components: a sensor information accumulating unit **102**, a road information detecting unit **103**, a road information detection-rules managing unit **104**, a driving state estimating unit **105**, a driving state estimation-rules managing unit **106**, a map information managing unit **107**, a user notification unit **108**, and a road information transmitting unit **109**. The respective processing that will be explained hereinafter is implemented in such a manner that the CPU **120** executes the respective program stored in the storage unit **124**. Incidentally, these programs may be stored into a computer-

readable memory medium, and may be installed into the terminal device **101** from this memory medium.

The sensor information accumulating unit **102** accumulates sensor information by collecting this sensor information periodically. Here, this sensor information is acquired from a (not-illustrated) built-in sensor that is built in the terminal device **101**. The sensor information accumulating unit **102** manages the history of the sensor information in the number determined in advance, such as, e.g., the amount of one hour or one day. The acquisition time-period of the sensor information to be accumulated may be determined using the time or data amount. Also, the upper-limit value of the sensor information to be accumulated may be fixedly set in advance, or the upper-limit value may be configured so as to be changed by the center server **201**. The type of the built-in sensor built in the terminal device **101** is GPS (Global Positioning System) sensor, acceleration sensor, gyro sensor, temperature sensor, luminance sensor, or the like. Also, not only the sensor information acquired from the built-in sensor built in the terminal device **101** but also sensor information acquired from the outside via communications may be accumulated. For example, the communication connection with the vehicle may be established, and the control information (i.e., vehicle's speed, engine's rotation number, and the like) may be acquired and accumulated. Also, for example, a sensor may be affixed to the user, and the user's heart rate and the like may be collected and accumulated.

The road information detecting unit **103** detects the road information from the history of the sensor information accumulated into the sensor information accumulating unit **102**. Moreover, the user notification unit **108** presents the detected road information to the user, thereby prompting the user to confirm the road information. If the road information is instructed explicitly so as to be registered by the user, the road information is transmitted to the center server **201** by the road information transmitting unit **109**, then being accumulated into the center server **201**. Incidentally, when the user notification unit **108** presents the traffic information to the user, the driving state estimating unit **105** confirms the driving state of the user, thereby judging whether or not the driving state is a state in which it is allowable to present the road information to the user. Then, if the driving state is not the state in which it is allowable to present the road information to the user, the user notification unit **108** waits for the driving state to become the state in which it is allowable to present the road information, and then presents the road information to the user. The map information managing unit **107** manages the following map information: road link information indicating road's position and shape, intersection related information (coordinate, lane information (such as presence or absence of right-turn exclusive lane), direction sign, and the like), information about address, facilities, telephone number, and the like, and map information becoming necessary for car navigation. Also, the map information managing unit **107** manages information set by the user, such as user's home position and vehicle's driving-schedule route. These pieces of map information are utilized for the detection of the road information in the road information detecting unit **103**, and the estimation of the driving state in the driving state estimating unit **105**.

Next, FIG. **2** illustrates the specific configuration of the center server **201**. The center server **201** includes a CPU **220**, an input unit **221**, an output unit **222**, a communication unit **223**, and a storage unit **224**. The storage unit **224**, which is a device such as semiconductor memories or HDD, stores programs and data therein. The CPU **220** executes processings on the basis of the programs and data stored in the storage unit **224**. When updating road information detection rules or driving state estimation rules, the input unit **221** detects an operation of the center server **201** performed by the user, then outputting this operation as the input information. Also, the output unit **222** displays an image, or makes a sound in accordance with the instruction from the CPU **220**, thereby prompting the user to make the confirmation. The communications unit **223** is connected to the communication unit **123** of the terminal device **101** via the communications path **130**. In this way, the communication unit **223** performs communication with the terminal device **101**.

The storage unit **224** stores a program and/or data for implementing each of the following configuration components: a road information receiving unit **202**, a road information accumulating unit **203**, a road information detection-rules updating unit **204**, and a driving state estimation-rules updating unit **205**. The respective processing that will be explained hereinafter is implemented in such a manner that the CPU **220** executes the respective program stored in the storage unit **224**. Incidentally, these programs may be stored into a computer-readable storage medium, and may be installed into the center server **201** from this memory medium.

The road information receiving unit **202** accumulates information into the road information accumulating unit **203**. Here, this information is constituted from the road information, the occurrence position, and the occurrence point-in-time in a manner of being caused to correspond to each other. Also, the road information is transmitted from the road information transmitting unit **109** of the terminal device **101**. Based on this information accumulated into the road information accumulating unit **203**, the traffic information to be delivered to another vehicle is delivered thereto, and is shared therebetween. The delivery of the traffic information to another vehicle may be performed as follows: The entire information registered into the road information accumulating unit **203** may be delivered; or the plural pieces of road information that have occurred at proximate locations may be delivered after being merged with each other; or only the traffic information whose type has been determined in advance may be delivered; or the traffic information to be delivered may be changed depending on the time-zone or the like.

The road information detection-rules updating unit **204** updates, from the center server, the road information detection rules managed in the road information detection-rules managing unit **104** of the terminal device **101**. The detection rules are detection rules utilized in the road information detecting unit **103** in order to detect the road information. Also, the driving state estimation-rules updating unit **205** updates, from the center server, the driving state estimation rules managed in the driving state estimation-rules managing unit **106** of the terminal device **101**. The estimation rules are estimation rules utilized in the driving state estimating unit **105** in order to judge whether or not the driving state is the state in which it is allowable to prompt the user to confirm the road information. As regards the road information detection rules and the driving state estimation rules, the delivery may be performed as follows: One and the same estimation rule may be delivered from the center server to all of the terminal devices **101**; or an estimation rule corresponding to each local area may be delivered on each local-area basis from the center server; or the estimation rules may be optimized in harmony with the ways in which

the users drive the vehicles, and estimation rules different from each other on each user basis may be delivered from the center server. Also, the update timings for the estimation rules of the road information detection-rules managing unit **104** and the driving state estimation-rules managing unit **106** may be implemented as follows: An inquiry may be automatically made about the update from the terminal device **101** to the center server **201** periodically; or the inquiry may be made to the center server **201** with a timing that is explicitly instructed by the user using a button pushing or the like.

FIG. **3** illustrates the table configuration of the road information detection-rules managing unit **104** of the terminal device **101**. This table is a table for managing the detection rules for detecting the road information from the sensor information and the map information. This table is constituted from road information **301**, sensor type **302**, sensor information acquisition time-period **303**, and detection rule **304**. The road information **301** indicates road information that becomes the detection targets. The sensor type **302** indicates the types of sensors that become necessary for detecting the road information. The sensor information acquisition time-period **303** indicates time-periods during which the sensor information utilized for detecting the road information is acquired. The detection rule **304** indicates a method for detecting the road information using the sensors indicated by the sensor type **302**. For example, in order to detect "new road" that is not described on the map, it is advisable just to detect that the position information on the terminal device **101** deviates from the road link and moves, and restores back to another road link. On account of this, the detection rule **304** turns out to be a rule that "the position information deviates from the road link, and after moving for a while about a place other than the road link, the position information rides on another road link". The sensor type **302** that becomes necessary therefor turns out to be "GPS sensor".

Here, "the road link" described in the detection rule **304** is map information, and can be acquired from the map information managing unit **107**. Also, in order to detect "closed to traffic", it is advisable just to detect that the position information on the terminal device **101** moves along the road link in the opposite direction in a short time. Moreover, in order to detect "U-turn available", similarly to the case where "closed to traffic" is detected, it is advisable just to detect that the position information on the terminal device **101** moves along the road link in the opposite direction in a short time. Here, by taking into consideration the information acquired from a plurality of terminal devices **101**, it becomes possible to make a distinction between "closed to traffic" and "U-turn available". For example, the following method is conceivable for the distinction: If the above-described detection rule holds in all of the terminal devices that will pass through this road link during a certain constant time-period (time), the road information is judged to be the "closed to traffic". Meanwhile, if the above-described detection rule holds only in some of the terminal devices, the road information is judged to be the "U-turn available".

Next, in order to detect "parking-lot entrance", it is advisable just to detect that the position information on the terminal device **101** remains unchanged during a constant time-period, after the position information has deviated from the road link. Also, in order to detect "byroad", it is advisable just to detect that the position information on the terminal device **101** shortcuts the scheduled route (i.e., road link). Namely, if it is detected that the position information moves along a road link not included in the scheduled route, and joins the scheduled route again, the road information can be estimated to be "byroad". Also, in order to detect "dangerous spot", it is advisable just to utilize the information acquired from the acceleration sensor or gyro sensor of the terminal device **101**. For example, if it is detected that a negative acceleration of 0.2 G or more has occurred, it is judged that a sudden braking has been applied. Accordingly, the road information can be judged to be the "dangerous spot". In this case, the necessary sensor type **302** turns out to be "acceleration sensor" or "gyro sensor".

FIG. **4** illustrates the table configuration of the driving state estimation-rules managing unit **106** of the terminal device **101**. This table is a table for managing the estimation rules for estimating the driving states from the sensor information and the map information. This table is constituted from driving state **401**, sensor type **402**, sensor information acquisition time-period **403**, and estimation rule **404**. The driving state **401** indicates driving states that become the detection targets. The sensor type **402** indicates the types of sensors that become necessary for estimating the driving states. The sensor information acquisition time-period **403** indicates time-periods during which the sensor information utilized for estimating the driving states is acquired. The detection rule **404** indicates a method for estimating the driving states using the sensors indicated by the sensor type **402**. This method means that, if the estimation rule **404** is satisfied, it is in the driving state **401**. For example, if the vehicle stops (=the position information remains unchanged) in proximity to an intersection point, the driving state can be estimated to be a state of "waiting for signal change". On account of this, the estimation rule **404** for which the driving state **401** is the "waiting for signal change" turns out to be a rule that "the position information remains unchanged in proximity to the intersection point during a constant time-period", and the sensor type **302** that becomes necessary therefor turns out to be "GPS sensor". Here, the coordinate information on "the intersection point" described in the estimation rule **404** can be acquired from the map information managing unit **107**. Accordingly, in this case, the driving state is the state of "waiting for signal change" in which the position information remains unchanged. Consequently, this driving state is judged to be the state in which it is allowable to present the road information to the user.

Also, in order to estimate "stop at parking lot", it is advisable just to detect that the position information on the terminal device **101** remains unchanged during a constant time-period, after the position information has deviated from the road link. Accordingly, in this case, the driving state is the state of "stop at parking lot" in which the position information remains unchanged, either. Consequently, this driving state is also judged to be the state in which it is allowable to present the road information to the user. Furthermore, in order to estimate "slow driving/traffic congestion", it is advisable just to detect that, for example, the acceleration is less than a predetermine value. Accordingly, in this case, the driving state is the state of "slow driving/traffic congestion" in which the change in the position information is less than the predetermine value. Consequently, the driving state is judged to be the state in which it is allowable to present the road information to the user. In this way, the driving states to be memorized into the above-described table are the driving states (such as the "waiting for signal change" and the "stop at parking lot") in which it is allowable to attract the user's attention. Namely, these driving states are the states in which it is allowable to

prompt the user to confirm the road information (i.e., the states in which it is allowable to prompt the user to make the judgment of necessity/unnecessity of registration about the road information).

FIG. **5** illustrates the table configuration of the road information accumulating unit **203** of the center server **201**. This table is a table for managing the road information received from the terminal device **101**. This table is constituted from road information **501**, occurrence position **502**, and occurrence point-in-time **503** in a manner of being caused to correspond to each other. The occurrence position **502** indicates occurrence positions of the road information **501**. As the occurrence positions, there exist an occurrence position represented by the line-segment (i.e., point string) like "new road", and an occurrence position represented by the points like "parking-lot entrance". The occurrence point-in-time **503** indicates occurrence the points-in-time at which the road information **501** has occurred.

FIG. **6** illustrates a processing flow performed by the road information detecting unit **103** of the terminal device **101**. First of all, at a step **601**, at the time of starting the processing application, or for each lapse of a constant time-period, the road information detecting unit **103** acquires one of the road information detection rules managed by the road information detection-rules managing unit **104**. Next at a step **602**, the unit **103** acquires the sensor information and map information, which become necessary for detecting the road information. Concretely, first, based on the sensor type **302** and sensor information acquisition time-period **303** corresponding to the road information detection rule acquired at the step **601**, the unit **103** accesses the sensor information accumulating unit **102**, thereby acquiring the sensor information therefrom. Here, together with the sensor information, the unit **103** acquires GPS point-in-time information and GPS position information as well from the sensor information accumulating unit **102**. This is performed in order to identify the occurrence point-in-time and the occurrence position of the road information. Also, the unit **103** accesses the map information managing unit **107**, thereby acquiring the map information therefrom. For example, if, at the step **601**, the unit **103** has acquired the detection rule of "new road", the unit **103** acquires, from the sensor information accumulating unit **102**, the GPS position information by the amount of 3 minutes, and acquires, from the map information managing unit **107**, the road link information that becomes necessary for detecting the road information.

Next, at a step **603**, the unit **103** judges whether or not the sensor information acquired at the step **602** satisfies the road information detection rule. If the sensor information satisfies the detection rule (Yes), the unit **103** proceeds to a step **604**. Meanwhile, if the sensor information does not satisfy the detection rule (No), the unit **103** proceeds to a step **605**. At the step **604**, the unit **103** notifies the user notification unit **108** about the road information detected from the sensor information. When notifying the user notification unit **108**, the unit **103** passes not only the detected road information but also the occurrence point-in-time and the occurrence position as additional information. The occurrence point-in-time can be identified from the GPS point-in-time information when the detection rule is satisfied, and the occurrence position can be identified from the GPS position information when the detection rule is satisfied. At the step **605**, the unit **103** confirms whether or not all of the road information detection rules managed by the road information detection-rules managing unit **104** have been confirmed. If all of the road information detection rules have been confirmed, the unit **103** ends the processing. Meanwhile, if an unconfirmed road information detection rule still exists, the unit **103** returns to the step **601**. Since the road information detection rules such as the "new road", "closed to traffic", and "U-turn available" are independent of each other, a plurality of detection rules can be satisfied in a short time.

FIG. **7** illustrates a processing flow performed by the user notification unit **108** of the terminal device **101**. First of all, at a step **701**, the user notification unit **108** receives the road information about which the unit **108** has been notified by the road information detecting unit **103**. Next, at a step **702**, the user notification unit **108** accesses the driving state estimating unit **105**, thereby judging whether or not the driving state is a state in which it is allowable to prompt the user to confirm the road information. The driving states in which it is allowable to prompt the user to confirm the road information are defined in the driving state estimation-rules managing unit **106**. Concretely, the driving state estimating unit **105** confirms whether or not all of the driving state estimation rules **404** stored into the driving state estimation-rules managing unit **106** are satisfied. For example, in the case of the estimation rule **404** of "waiting for signal change", the unit **105** acquires, from the sensor information accumulating unit **102**, the "GPS position" information by the amount of 5 seconds, which is described in the sensor type **402** and sensor information acquisition time-period **403**. Moreover, based on the GPS position information acquired, the unit **105** acquires, from the map information managing unit **107**, the coordinate information on the "intersection point" in proximity to this GPS position. Then, the unit **105** judges whether or not the estimation rule **404** is satisfied. If the estimation rule **404** of "the position information remains unchanged in proximity to the intersection point during 5 seconds" is satisfied, the driving state is the "waiting for signal change", so that this driving state is judged to be the state in which it is allowable to prompt the user to confirm the road information. Meanwhile if the estimation rule **404** is not satisfied, the unit **105** confirms whether or not the next estimation rule is satisfied. If not a single estimation rule is satisfied, the driving states are judged to be states in which it is not allowable to prompt the user to confirm the road information. As a result of the above-described judgment made by the driving state estimating unit **105**, if the driving state is the state in which it is allowable to prompt the user to confirm the road information (Yes), the user notification unit **108** proceeds to a step **703**. Meanwhile, if the driving state is the state in which it is not allowable to prompt the user to confirm the road information (No), the unit **108** proceeds to a step **704**.

Incidentally, if it is not allowable to prompt the user to confirm the road information immediately, it is necessary to wait for the driving state of the user to change to a state in which it is allowable to prompt the user to make this confirmation, and afterwards, it is necessary to request the user to make this confirmation. At the step **703**, the user notification unit **108** presents the road information to the user, and requests the user to confirm the necessity/unnecessity of registration of the road information. This confirmation may be made to the user only by the image display, or may be made by the image and voice. Concrete examples of this image display will be explained using FIG. **8** and FIG. **9**. At the step **704**, if it is not allowable to prompt the user to confirm the road information, the unit **108** confirms whether or not the user has been already notified about the fact that the road information had been detected. The unit **108** returns to the step **702** if the user has been already notified (Yes); whereas, the unit **108** proceeds to a step **705**

if the user has been not notified yet (No). At the step **705**, the unit **108** notifies the user only about the fact that the road information had been detected. This is because it is not allowable to prompt the user to confirm the road information. In this way, the user is notified in advance about the fact that the road information had been detected, and the location at which the road information had been detected. This notification makes it possible to permit the user to make the confirmation easily after the driving state has changed to the state in which it is allowable to prompt the user to make the confirmation. In the driving state in which it is not allowable to prompt the user to confirm the road information, the user is driving the vehicle, and cannot watch the image. Consequently, the user is informed about the detection of the road information by a voice such as "Please register the new road later.", or a sound such as "peep".

FIG. **8** illustrates an example of the image display of the terminal device **101** in the user notification unit **108**. Concretely, FIG. **8** illustrates the image display's example in a case where a pop-up for confirming the road information is displayed when the navigation is operated in the terminal device **101**. Namely, FIG. **8** illustrates the example where the pop-up **801** for confirming the road information is displayed on a navigation image **810**. The pop-up **801** displays thereon a sentence **802** for prompting the registration of the road information, a registration button **803**, a confirmation button **804**, and a timer **805**. The sentence **802** for prompting the registration of the road information describes therein the name (e.g., "new road") of the road information detected by the road information detecting unit **103**. The registration button **803** is a button for registering the road information. The user's pushing down the registration button **803** causes the road information to be transmitted from the road information transmitting unit **109** to the center server **201**.

The confirmation button **804** is a button for confirming the location at which the road information has occurred. The user's pushing down the confirmation button **804** causes the pop-up **801** to be temporarily non-displayed. Then, the location of the navigation image **810** moves to the location at which the road information has occurred. While the occurrence location of the road information is being displayed, instead of causing the pop-up **801** to be temporarily non-displayed, it is also allowable to make the pop-up **801** semi-transparent so that the map behind the pop-up **801** can be confirmed. Otherwise, it is also allowable to move the pop-up **801** to a not-disturbing location at an edge of the image. The timer **805** indicates a time that elapses until the pop-up **801** disappears. The timer **805** counts down gradually, and when it comes to "0", the pop-up **801** will disappear whatever operation the user does not perform. If the timer **805** comes to "0" while the user is performing an operation, it is also allowable to extinguish the pop-up **801**. Otherwise, even if the timer **805** comes to "0" during the user's operation, it is also allowable not to extinguish the pop-up **801**. Otherwise, it is also allowable to prohibit the pop-up **801** from counting down during the user's operation. Otherwise, even if the timer **805** counts down halfway, it is also allowable to cause the timer **805** to return to its value before the count-down (i.e., its initial value). Otherwise, it is also allowable to extinguish the pop-up **801**, detecting that the driving state becomes the state in which it is not allowable to prompt the user to confirm the road information.

FIG. **9** illustrates another example of the image display of the terminal device **101** in the user notification unit **108**. FIG. **8** illustrated the image display's example where the user is requested to confirm the road information by the pop-up **801**. In contrast thereto, FIG. **9** illustrates the image display's example where the user is requested to confirm the road information by dividing the image. Namely, the image display of the terminal device **101** is divided into the navigation image **810** and a confirmation image **901** of the road information. The road-information confirmation image **901** displays road information **902** of first candidate and road information **903** of second candidate. Each of the candidates displays thereon type, occurrence point-in-time, a registration button, and an occurrence-location confirmation button of the road information detected. For example, in the road information **902** of the first candidate, "new road" and "27 seconds before" are displayed as the detected road information and the occurrence point-in-time, respectively.

The navigation image **810** displays the image display's example in a case where the road information **902** of the first candidate is pushed down. In the navigation image **810**, the occurrence location **904** of the new road is displayed on the map. The detection number **905** of the road information is displayed together therewith. The detection number **905** of the image display's example indicates that three pieces of road information are detected. Although only the two candidates are displayed in the image display's example, three or more candidates may be displayed. With regard to the arrangement order, the candidates may be arranged in an order ranging from the newest occurrence point-in-time to the oldest one; or in an order ranging from the oldest occurrence point-in-time to the newest one; or the candidates may be arranged in a manner of being sorted for each type of the road information; or the candidates may be arranged in an order ranging from the occurrence location closest to the present location.

Also, it is also allowable to display plural pieces of road information in a manner of being limited to the road information that have occurred within a certain time (such as, e.g., within 3 minutes). Otherwise, it is also allowable to display the plural pieces of road information in a manner of being limited to the road information of a specific type or types (such as, e.g., new road alone, or new road and byroad). In the image display's example, the first candidate is displayed in a larger font size and with larger buttons as compared with the second candidate, so that the user can confirm them easily. It is also allowable to display the navigation image **810** and the road-information confirmation image **901** in the state of being always divided to each other. Otherwise, it is also allowable to perform the division display, detecting that the driving state becomes the state in which it is allowable to prompt the user to confirm the road information. Otherwise, it is also allowable to perform the division display, detecting that the user touches the road-information detection number **905**. Moreover, it is also allowable to release the division of the divided image with a lapse of a constant time, and to permit the image display to return to the navigation image **810** alone. Otherwise, it is also allowable to release the division if the user operation is absent during a constant time. Otherwise, it is also allowable to release the division, detecting that the driving state becomes the state in which it is not allowable to prompt the user to confirm the road information.

Incidentally, in the present embodiment, the road information detecting unit **103**, the road information detection-rules managing unit **104**, the driving state estimating unit **105**, the driving state estimation-rules managing unit **106**, and the map information managing unit **107** are stored into the terminal device **101**. It is also allowable, however, to implement a configuration that these units are stored into the storage unit of the center server **201**. The explanation of the

configurations that overlap with the above-described embodiment will be omitted. In this case, the sensor information is acquired from the sensor information accumulating unit **102** where the respective types of sensor information are accumulated. Moreover, based on the sensor information acquired, the matching between the road information and the road information detection rules is executed on the side of the center server **201**. As a result of the matching, if the road information coincides with any one of the road information detection rules memorized in the road information detection-rules managing unit **104**, this road information is transmitted to the terminal device **101**. Furthermore, in accordance with the driving state estimation rules, this road information is presented to the user by the user notification unit **108**. As a result of this presentation, if the registration button is selected, this road information is accumulated into the road information accumulating unit **203** via the road information receiving unit **202** of the center server **201**. By employing this configuration, it becomes possible to reduce the load imposed on the processing capability in the terminal device **101**.

It should be further understood by those skilled in the art that although the foregoing description has been made on embodiments of the invention, the invention is not limited thereto and various changes and modifications may be made without departing from the spirit of the invention and the scope of the appended claims.

The invention claimed is:

1. A road information sharing method in a road information sharing system for sharing road information, comprising:

storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with said terminal device;

detecting said road information from said sensor information based on detection rules for detecting said road information;

estimating a driving state of said vehicle from said sensor information based on estimation rules for estimating said driving state of said vehicle moving in accompaniment with said terminal device;

judging whether or not said estimated driving state is a state in which it is allowable to prompt a user to make a judgment of necessity/unnecessity of registration of said detected road information based on said driving state;

notifying said user about said detected road information;

when said driving state is said state in which it is allowable to prompt said user, prompting said user to make said judgment of necessity/unnecessity of registration about said detected road information;

when said driving state is not said state in which it is allowable to prompt said user, waiting for said driving state to become said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, and then prompting said user to make said judgment of necessity/unnecessity of registration; and

when said detected road information is judged to be registration necessary by said user, storing said detected road information or outputting said detected road information to an external device,

wherein said notification to said user is executed a plurality of times including a first time of notifying said user about said detected road information using a sound and a second time of notifying said user about said detected road information using a pop-up or image information for prompting said user to make said judgment of necessity/unnecessity of registration about said detected road information.

2. The road information sharing method according to claim **1**, further comprising:

when driving state is not said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, notifying said user that said user will be prompted to make said judgment of necessity/unnecessity of registration at a later time.

3. The road information sharing method according to claim **1**, wherein whether or not said estimated driving state is said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration of said detected road information is judged based on said driving state, said stored sensor information and map information.

4. A road information sharing method in a road information sharing system for sharing road information, comprising the steps of:

storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with said terminal device;

detecting said road information from said sensor information based on detection rules for detecting said road information;

estimating a driving state of said vehicle from said sensor information based on estimation rules for estimating said driving state of said vehicle moving in accompaniment with said terminal device;

judging whether or not said estimated driving state is a state in which it is allowable to prompt a user to make a judgment of necessity/unnecessity of registration of said detected road information based on said driving state;

notifying said user about said road information detected;

when said driving state is said state in which it is allowable to prompt said user, prompting said user to make said judgment of necessity/unnecessity of registration about said detected road information by displaying an image; and

when said detected road information is judged to be registration necessary by said user, storing said detected road information or outputting said detected road information to an external device,

wherein, when said driving state changes from said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration to said state in which it should not be performed to prompt said user to make said judgment of necessity/unnecessity of registration, said image is controlled so as not to be displayed.

5. The road information sharing method according to claim **4**, further comprising:

when said driving state is not said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, waiting for said driving state to become said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, and then prompting said user to make said judgment of necessity/unnecessity of registration.

6. The road information sharing method according to claim **5**, wherein said notification to said user is executed a plurality of times including a first time of notifying said user about said detected road information using a sound and a second time of notifying said user about said detected road

information using a pop-up or image information for prompting said user to make said judgment of necessity/unnecessity of registration about said detected road information.

7. The road information sharing method according to claim 4, further comprising:

when said driving state is not said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, notifying said user that said user will be prompted to make said judgment of necessity/unnecessity of registration at a later time.

8. The road information sharing method according to claim 4, wherein whether or not said estimated driving state is said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration of said detected road information is judged based on said driving state, said stored sensor information and map information.

9. A road information sharing method in a road information sharing system for sharing road information, comprising the steps of:

storing sensor information acquired from a terminal device or a vehicle moving in accompaniment with said terminal device;

detecting said road information from said sensor information based on detection rules for detecting said road information;

notifying a user about said road information detected, and prompting said user to make a judgment of necessity/unnecessity of registration about said detected road information; and

storing said detected road information, or outputting said detected road information to an external device, if said detected road information is judged to be registration necessary by said user,

wherein, when said road information is detected as plural pieces of road information, said user is notified about said detected plural pieces of road information in accordance with priority degrees being assigned based on respective detection points-in-time or respective distances between detection locations and a present position.

10. The road information sharing method according to claim 9, further comprising:

estimating a driving state of said vehicle from said sensor information based on estimation rules for estimating said driving state of said vehicle moving in accompaniment with said terminal device; and

judging whether or not said estimated driving state is a state in which it is allowable to prompt said user to make a judgment of necessity/unnecessity of registration of said detected road information based on said driving state.

11. The road information sharing method according to claim 10, further comprising:

when driving state is said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, prompting said user to make said judgment of necessity/unnecessity of registration about said detected road information; and

when said driving state is not said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, waiting for said driving state to become said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, and then prompting said user to make said judgment of necessity/unnecessity of registration.

12. The road information sharing method according to claim 11, wherein said notification to said user is executed a plurality of times including a first time of notifying said user about said detected road information using a sound and a second time of notifying said user about said detected road information using a pop-up or image information for prompting said user to make said judgment of necessity/unnecessity of registration about said detected road information.

13. The road information sharing method according to claim 10, further comprising:

when said driving state is judged not to be said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration, notifying said user that said user will be prompted to make said judgment of necessity/unnecessity of registration at a later time.

14. The road information sharing method according to claim 10, wherein whether or not said estimated driving state is said state in which it is allowable to prompt said user to make said judgment of necessity/unnecessity of registration of said detected road information is judged based on said driving state, said stored sensor information and map information.

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